

# A Case Study on Early-Onset Invasive Adenocarcinoma in a Young Patient: Diagnostic Challenges and Therapeutic Approaches

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## 1. Introduction

Colon cancer is one of the most common cancers worldwide. Although deaths among those with colon and rectal cancer have been on the decline in recent years; the incidence of colon cancer diagnosis in a younger population has been on the rise. This is ultimately due to lifestyles, diet, and environmental impacts. Moreover, the advancement in cancer treatments has allowed colorectal patients to receive a more targeted treatment than before. The American cancer society estimated that in 2024, the incidence of colorectal cancer is 106 590, in which 54,210 will be men. The overall lifetime risk of developing colorectal cancer is approximately 1 in 23 for men, and the median age of diagnosis for CRC is 66 years in men [1-2]. Young patients who are at an increased risk for colorectal cancer are those with inflammatory bowel disease, hereditary nonpolyposis colon cancer and strong family history. However, in those high-risk populations, many undergo screening which has been shown to reduce mortality [4]. Therefore, there is a potential problem for patients with no risk factors or strong family history, leading to reduced early screening and late intervention. It is more often the case in some locally aggressive colorectal tumors which cause complete obstruction. It thus remains a question whether certain locally aggressive colorectal tumors should be surgically removed, in cases where postoperative complications may change the outcome and complicate management of the patient, or, if palliative care would provide more comfort and improve quality of life. We therefore look at comparing diverting compared to trying a curative resection, the benefits of a non surgical approach vs palliative surgery; and open vs laparoscopic approach in cases where

surgical intervention is in the patient's best interest. We present a case of a 35 year old with a locally advanced obstructing right sided colon mass.

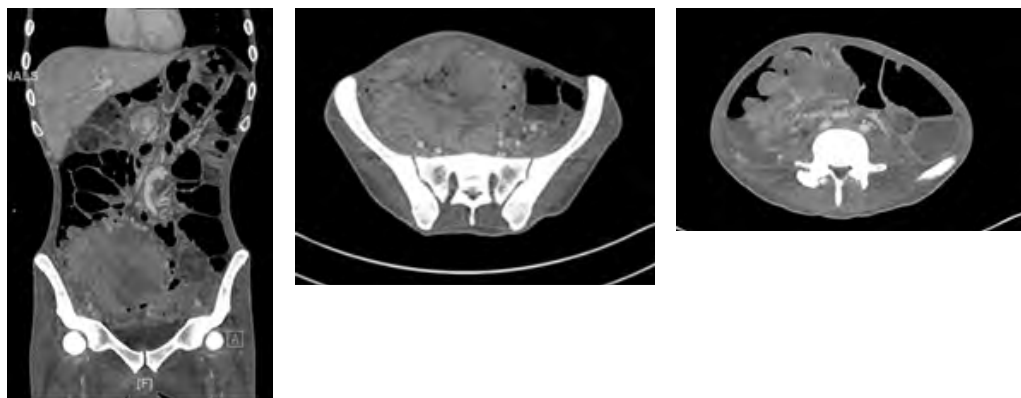
## 2. Presentation of the Case

A 35 year-old male presented to the emergency department for abdominal pain, feeling of fullness, weakness and fatigue. About 3 months prior to his presentation to the hospital, he started experiencing abdominal pain, non-related to meals, which was associated with fatigue, diarrhea, reduced appetite and about 50lb weight loss. Patient denied any constipation and other contributing factors. The patient had a strong family history of ovarian and pancreatic cancer in his mother that was diagnosed at 35 years, although the father had no relevant medical history. Upon physical exam, the patient was cachectic and abdominal exam revealed tenderness and a mass that was easily palpated in the right lower quadrant. A CT-scan obtained during admission demonstrated a 10.6 cm Anteroposterior x 14.9 cm transverse x 14 cm craniocaudal enhancing soft tissue mass centered within the right lower quadrant and pelvis (Figure 1). There was a central area of necrosis with fluid and gas, hydronephrosis of the right kidney and small focus of gas in the bladder.

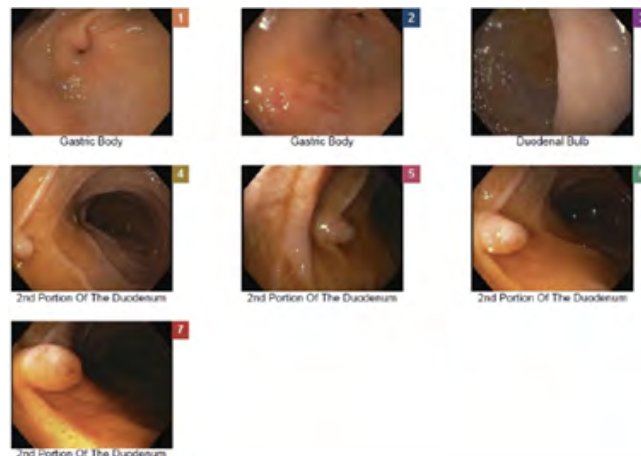
Tests for tumor markers showed a CA 19-9 of 46 and a chromogranin A of 713. AFP, carcinoembryonic antigen and HCG beta-subunit tumor markers were all within normal limits. The patient's nutritional status was not optimal, with albumin levels at 2.5 and total protein level at 6.1. (Figure 2). The patient underwent c-scope The colonoscopy, however, revealed a nearly obstructing fungat-

ing exophytic mass in the ascending colon (Figure 3). Pathological report from the antral biopsy demonstrated gastric mucosa with foveolar hyperplasia and gastric biopsy showed gastric mucosa with minimal chronic inflammation. Furthermore, the colon mass revealed invasive well differentiated adenocarcinoma of the colon with strong clinical significance of KRAS but a low tumor mutation burden (4.7 mutation/mb) with MSI negative of 2.44%. Subsequently, the patient underwent an exploratory laparotomy, en-bloc resection of his right colon, peritoneum and portion of bladder, as the mass was found to be invading the above structures. The patient was closed with a double barrel colostomy and ileostomy. Pathology reported invasive well differentiated adenocarcinoma of the colon with extension into the small intestine and invasion into the visceral peritoneum. Furthermore, zero out of 16 lymph nodes

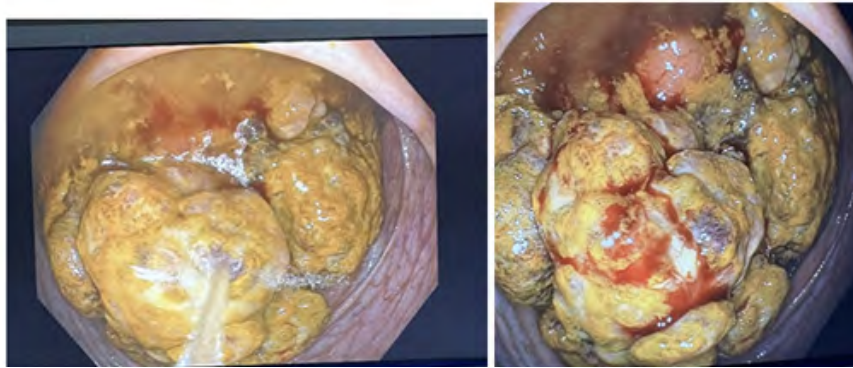
were benign suggesting no distant metastasis. Finally, abdominal fluid cytology was negative for malignant cells. According to the National comprehensive cancer network (NCCN), the tumor staging for this patient is stage IVC (T4b, N0, M1c). Thus, according to the clinical presentation; a colectomy with en bloc removal of regional lymph nodes is suggested for this patient according to the guidelines. Furthermore, adjuvant treatment would be recommended after surgery with our patient, due to the aggressive, invasive nature of his tumor and cachectic figure, his post-operative rehabilitation was going to be strenuous and demanding and the need for chemotherapy post operatively was questioned. The patient was unable to be weaned off the vent, thus, a tracheotomy and a peg tube was administered, and the patient was then sent to a long-term rehabilitation facility.



**Figure 1:** CT-scan of a 10.6 cm Anteroposterior x 14.9 cm transverse x 14 cm craniocaudal enhancing soft tissue mass centered within the right lower quadrant and pelvis.



**Figure 2:** Esophagogastroduodenoscopy showing two non-bleeding cratered gastric ulcers with no stigmata of bleeding in gastric antrum.



**Figure 3:** Colonoscopy demonstrating a nearly obstructing fungating exophytic mass in ascending colon.

### 3. Discussion

#### 3.1. Incidence Of Colon Cancer Among Young Population and Molecular Biology

The incidence of colon cancer in the young population has been on the rise. Incidence rates have been rising rapidly among adults between the ages of 20–49 in the United States, from 8.6 per 100,000 in 1992 to 13.1 per 100,000 in 2016, with the largest increase being among adults 40–49 years old. This early-onset colorectal cancer diagnosis of individuals under the age of 50 now accounts for 10%–12% of all new CRC diagnosis [15]. The molecular biology of colon cancer arises from colonic epithelial cells that line the lumen. The development of a neoplastic tubular colonic adenoma begins from polypoid structures that grow into the lumen space, and with time, acquire disorder and dysplastic growth that breach the underlying basement membrane [1]. The cancer can slowly over time obstruct the colonic lumen, preventing the passage of fecal matter, leading to a complete obstruction and possible rupture. Tumors can be locally advanced in 10-20% of the patients or invade into nearby organs, causing a challenge for surgeons to resect the tumor and have positive outcomes for the patient [2]. Moreover, when a surgeon performs a resection, they will need to create an anastomosis with the remaining part of the rectum, which can sometimes lead to serious complications such as anastomotic leak, bleeding and infection. Thus, it is crucial that the risk vs benefits are weighed when deciding which treatment plan is most appropriate for the patient.

#### 3.2. Treatment Options for Locally Advanced/Obstructing Colon Cancers

Finding and diagnosing adenocarcinoma of the small and large bowel can be delayed due to nonspecific symptoms that patients may experience [5] especially in young patients with no significant history. Thus, delay of identifying invasive adenocarcinoma in a timely manner can lead to poor prognosis despite surgery and increases the need for neoadjuvant or adjuvant chemotherapy [5]. However, the option of surgery remains in order to treat colonic obstruction, with essentially three methods that can be used. First

would be to leave the tumor and recommend palliative care, second would be emergent surgical resection with or without a diversion and the third would be whether to divert or anastomose. The first option is more often for poor surgical candidates with very advanced disease in which any intervention would not change outcome or provide any benefits to the patient. These specific patients can sometimes undergo stent placement to alleviate the obstructive symptoms or a bowel diversion with either a colostomy or ileostomy. In a cohort study comparing emergent surgical resection vs diverting stoma followed by elective resection in patients with colonic obstruction due to locally advanced cancer, it was shown that the 5- year survival rate of patients with right-sided tumors was 25% and 46% respectively [6]. For left sided tumors, emergency surgery was independently associated with an increase in all -cause mortality when compared to right sided tumors but emergency resection was found to be more common in patients with right- sided tumors than in patients with left sided tumors. The patient in this cohort, as it was the case in our patient, had poor nutritional status, dehydration and are not in prime physical condition which would explain the poor prognosis of emergent resection. A diverting stoma provides the advantages of patient optimization and possible neoadjuvant rectal cancer treatment (if indicated); giving the surgeon a better chance at resection given that locally advanced obstructing tumors are most of the time encasing other organs making resection even more challenging. It is said that 10-20% of locally advanced colon cancer can perforate or locally invade into surrounding organs. With regards to the bladder, if invasion or adherence of the tumor is suspected, an en bloc bladder resection is recommended in order to achieve local control and a better prognosis [16]. In addition, this study and many others examine the importance of using colonic stenting as a bridge for a later resection but this option is mostly used for left sided tumors [7,8]. Of note, the outcome with their use has been associated with multiple complications and various survival rates so it is mostly used as palliative treatment. Japanese studies have focused on data on right sided colonic tumors stenting specifically, in which there was no significant difference in post op mortality (1.6% vs 0.9%) between the urgent colectomy and stent groups but overall

complication rate was higher in the surgical group [7]. The downside is that stenting in the right colon sometimes would require a more skilled endoscopic and favorable setting. Moreover, in a retrospective cohort study with patients diagnosed with colorectal cancer, they looked at the benefits of a bridge to surgery, which is defined as the immediate treatment of the obstruction with a stent followed by delayed oncological surgery vs urgent colectomy. It was determined that patients who were operated with an acute resection of the tumor had a higher 30-day mortality rate and were left with a permanent stoma [9]. Moreover, more lymph nodes were able to be harvested in the diversion method, which translated into lower local recurrence rate and an overall better survival. Thus, there are definitely benefits to first clearing the obstruction and then scheduling a surgery later on when compared to emergent surgery. This extra time given to the patient allows them to gain more strength and energy to undergo a severe surgery, but also the bridge time allows more time to form a plan with various other specialty doctors on the team but unfortunately it is not always possible in all those cases. For some patients, by the time they find out they have colorectal cancer, it's possible the cancer may be locally advanced and even incurable. Patients may also be older in age, have comorbidities, or be extremely weak and nutritionally compromised, such as our patient. Thus, many aspects should be considered when deciding to undergo surgery compared to palliative treatment. Rendering the surgical option comes with high risk, and the main objective should be to remove the mass to avoid significant obstructions that could lead to bowel perforation. Since our patient was young, surgery was an option since there was a reasonable length of survival that could be achieved. However, a large portion of mortality in colorectal surgery resection is associated with complications such as anastomotic leak, although two studies demonstrated that the risk of anastomotic leakage was low. One study showed 2.8% out of 66% of patients who underwent a resection experience an anastomotic leak, and the second study reported one case out of 60 patients (10; 11). Anastomosis leak rates have been reported to be as low as 1–3% in right sided colon resections but can go up to 19% in coloanal anastomoses [17]. Furthermore, a retrospective study comparing 67 patients with incurable cancer, 46 who underwent a palliative resection and 21 who did not, demonstrated that the median survival of patients who underwent a resection was 544 days vs those who did not undergo a resection which was 233 days ( $p < 0.001$ ) [11]. Poor survival rate was associated with non-resection surgery and tumor differentiation. Other studies have found similar outcomes, showing that palliative surgery for colorectal cancer is associated with a lower mortality rate when compared to those who opt out of a resection [11]. Leaving the tumor in place will cause poor survival, thus, the clinical judgment a surgeon must make is crucial. However, being 35 years old with no comorbidities, the clinical judgment

used through carefully weighing risk vs benefits to resect the tumor, and creating an aggressive post-operative rehabilitation plan, could have reduced the course of survival for this patient.

In looking at the treatment regimen for a patient with invasive colorectal cancer, the discussion of laparoscopic vs. open approach is in question. Minimally invasive colorectal surgery has become a popular treatment choice over the last 20 years, with advantages ranging from reduced blood loss, early return of intestinal motility, lower overall mobility and shorter hospital stay [12]. More importantly, the benefits in short-term outcomes with laparoscopy is supported by peri-operative immunological response. It has been shown that in the early post-operative state of laparoscopic resection, better reserved cellular immune responses are more active, having higher levels of immune cells such as CD 8, T cells, total lymphocytes than compared to open resection [12]. Thus, it seems to demonstrate that a more active presence of immune cells following laparoscopic colectomy can contribute to an immunologic advantage, reflecting a reduction in operative trauma when compared to open procedures [12]. However, when looking at long-term survival, local or distant recurrence and long-term quality of life for colon cancer, trials were unable to show a difference between laparoscopic and opened resection [13]. Therefore, when using a laparoscopic approach, it can be said that the use of non-traumatic forceps, the use of an endobag and gradual desufflation with a laparoscopic extractor fan can all lead to a reduction in contamination and dissemination [14]. In taking all this into consideration, a laparoscopic approach does appear to have better short-term immunological advantage, increased oncological safety, however, long-term outcome is similar to that of open surgery.

#### 4. Conclusion

In conclusion, our patient was young, with no comorbidities, but was extremely weak and cachectic. When making the plan with the patient to undergo surgery, the possibility of a rigorous and long postoperative course was discussed. The surgical option when compared to palliative care could have been the reason for why he is alive today, however, perhaps the possibility of diverting around the tumor to give the patient more time to gain strength prior to oncological resection could have been considered but the nature of his symptoms made our surgical plan the probable best option for him.

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